

However, SSc patients had significantly lower LV global longitudinal strain (GLS), LV global circumferential strain (GCS) and LV twist compared to controls. Additionally, SSc patients with fQRS had significantly lower LV GLS and LV GCS compared to SSc patients with normal QRS complexes although their conventional echocardiographic measures were similar (Table). The SSc patients with fQRS in inferior leads had significantly impaired longitudinal strain values in the inferior LV segments compared to SSc patients with normal QRS complexes ( $20.2 \pm 1.7\%$  vs  $22.8 \pm 3.3\%$ ,  $p=0.017$ ).

**Conclusion:** SSc patients have regional subclinical myocardial dysfunction, which can be assessed successfully by 2D STE. Presence of fQRS in ECG is associated with lower strain measures in SSc patients indicating impaired LV function.

#### Strain parameters of the SSc patients and controls

	SSc patients with fQRS (n= 13)	SSc patients with normal QRS (n= 40)	Controls (n= 26)	p
GLS	-19.6 $\pm$ 2.1	-21.6 $\pm$ 2.1	- 25.8 $\pm$ 2.7	<0.001 *,+, $\alpha$
GRS	41.6 $\pm$ 18.3	37.9 $\pm$ 17.5	47.7 $\pm$ 7.0	0.053
GCS	-15.2 $\pm$ 5.1	-18.8 $\pm$ 4.9	-25.2 $\pm$ 3.3	<0.001 *,+, $\alpha$
Twist	18.9 $\pm$ 5.5	16.4 $\pm$ 8.8	31.8 $\pm$ 9.4	<0.001 +, $\alpha$

Data are presented as mean  $\pm$  standard deviation Posthoc analysis:  
\*  $p<0.05$  between SSc patients with fQRS and SSc patients with normal QRS +  $p<0.05$  between SSc patients with fQRS and controls  $\alpha$   $p<0.05$  between SSc patients with normal QRS and controls SSc: Systemic sclerosis; fQRS: Fragmented QRS; GLS: Global longitudinal strain; GRS: Global radial strain; GCS: Global circumferential strain

## Cardiac Imaging

### OP-005

#### Left Ventricular Rotational Deformation is Impaired in Pulmonary Hypertension: A Speckle Tracking Imaging- Based Study

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**Background:** Right ventricular (RV) pressure overload influences ventricular interdependence and subsequent left ventricular (LV) geometry. In the present study, we aimed to demonstrate the impact of increased RV pressure on LV systolic deformation and LV twist mechanics in the setting of pulmonary hypertension (PH).

**Methods:** We studied 25 patients with PH (age  $44.23 \pm 4.67$ , 56% female) without any cardiac disease, and 20 age and sex-matched healthy controls. Among 25 patients 18 had chronic obstructive pulmonary disease, 3 had chronic thromboembolic PH and the rest had systemic lupus erythematosus. Patients with intrinsic LV diseases were excluded. Conventional echocardiography and speckle tracking- based strain imaging were performed to analyze LV twist mechanics.

**Results:** Left ventricular end diastolic diameter, LV end systolic diameter and LV ejection fraction were similar between the groups. Right ventricular (RV) diameter was significantly increased in patients with PH ( $3.2 \pm 0.22$  cm to  $2.29 \pm 0.12$  cm;  $p=0.0001$ ). Left ventricular eccentricity index (EI) was also increased in the patient group, when compared to healthy controls ( $1.35 \pm 0.23$  to  $0.93 \pm 0.11$ ;  $p=0.0001$ ). Left ventricular torsion was markedly impaired in PH group, compared with control subjects ( $5.88 \pm 2.33^\circ$  to  $14.9 \pm 2.26^\circ$ ;  $p=0.0001$ ), demonstrating decreased LV twist mechanics. Additionally, we revealed that LV torsion was negatively correlated with pulmonary artery systolic pressure ( $r=-0.863$ ,  $p=0.0001$ ) and LV EI ( $r=-0.684$ ,  $p=0.0001$ ).

**Conclusions:** Chronic RV pressure overload influences LV geometry. LV torsion analysis based on speckle tracking echocardiography may provide insights into the impact of RV pressure overload on LV performance.

## Valvular Heart Diseases

### OP-006

#### Evaluating Left Ventricular Functions in Primary Mitral Regurgitation by Two Dimensional Strain Echocardiography

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**Introduction and AIM:** Patients who develop progressive left ventricular dilatation and left ventricular dysfunction as a result of irreversible myocardial damage during the follow-up of chronic mitral regurgitation are known to have worse prognosis. In these patients, more sensitive parameters are imposed for recognizing left ventricular (LV) dysfunction in early stages, than the existing parameters such as ejection fraction (LVEF). LV strain and strain rate (S/SR) parameters are new methods that are being used for the evaluation of ventricle function. Our study aims to evaluate patients with mitral regurgitation using S/SR imaging, who's LV functions are evaluated as normal with conventional methods and the early detection of dysfunction.

**Material-Methods:** This study included 40 patients who were being followed at our clinic for chronic mitral regurgitation with normal LVEF and 31 patients as a control group with normal echocardiographic evaluation and without any symptoms. Detailed echocardiography was performed in all patients. Patients with mitral regurgitation were divided into two groups as moderate (n:19) and severe (n:21) according to the methods of qualitative and quantitative evaluation. For the evaluation of LV longitudinal deformation using speckle tracking method, anterior, inferior, septum, lateral wall S/SR values; for the evaluation of the radial deformation posterior wall S/SR values were calculated. The anterior wall S/SR values were decreased in severe MR group compared with moderate MR group and control group, but was not statistically significant (S:-17,8 $\pm$ 3;-17,9 $\pm$ 3,8;-18,2 $\pm$ 3,9; SR:-1,04 $\pm$ 0,2;-1,2 $\pm$ 0,4; -1,2 $\pm$ 0,3;  $p>0,05$ ). Although the septum SR value was reduced in severe MR group, it was not statistically significant when compared with moderate MR group and control group (-1,2 $\pm$ 0,2; -1,3 $\pm$ 0,4; -1,3 $\pm$ 0,2;  $p>0,05$ ). Between three groups septum S values (-21,5 $\pm$ 2,9; -20,7 $\pm$ 4,7; -21,3 $\pm$ 3,5;  $p>0,05$ ), lateral wall S/SR values (S:-21,0 $\pm$ 3,3; -21,0 $\pm$ 4,8; -21,1 $\pm$ 3,9; SR:-1,4 $\pm$ 0,2; -1,6 $\pm$ 0,5; -1,3 $\pm$ 0,2;  $p>0,05$ ), inferior wall S/SR values (S:-22,4 $\pm$ 3,4; -21,7 $\pm$  3,1; -22,3 $\pm$ 3,3; SR:-1,4 $\pm$ 0,3; -1,4 $\pm$ 0,3; -1,5 $\pm$ 0,7;  $p>0,05$ ) were not significantly different. The global longitudinal strain values were not significantly different between severe MR, moderate MR and control groups (-20,9 $\pm$ 1,4; -20,9 $\pm$ 2,2; -20,5 $\pm$ 2,2;  $p>0,05$ ).

**Conclusion:** Despite the increase in the severity of mitral regurgitation in asymptomatic patients with primary mitral regurgitation, longitudinal and radial deformation parameters remained normal in patients which left ventricular function was evaluated as normal with conventional echocardiographic methods. As a result the deformation parameters were not superior to conventional methods in the early detection of left ventricular dysfunction due to the increase in severity of mitral regurgitation. In the long-term follow-up of these patients monitoring deformation parameters and comparing with monitoring conventional methods can be useful in evaluating left ventricle function.

### OP-007

#### Subclinical Left Ventricular Systolic Dysfunction in Patients with Severe Aortic Stenosis: A Speckle Tracking and Real Time Three Dimensional Echocardiographic Study

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**Background:** In patients with aortic stenosis (AS), changes in left ventricular (LV) geometry due to increased LV afterload, preserves LV ejection fraction (EF). However, subclinical myocardial dysfunction may develop despite normal LV EF. In the present study, we aimed to evaluate subclinical LV systolic dysfunction in patients with severe AS, without any cardiovascular disease and with normal LV EF, by using tissue Doppler imaging (TDI), a strain imaging method, "speckle tracking echocardiography" (STE) and its correlation with changes in LV geometry. We also performed a real time three dimensional echocardiography (3 DE) in order to demonstrate LV volumetric analysis.

**Methods:** We studied 25 patients (56% male, 73.9 years) with AS and 20 age and sex-matched controls, without any cardiac disease and with preserved LV EF. Conventional echocardiography, TDI, real time 3 DE and STE- based strain imaging were performed to analyse subclinical LV systolic function. Novel parameters currently used for the assessment of aortic stenosis severity were calculated according to related formulas (energy loss index (ELI), systemic arterial compliance (SAC), valvulo-arterial impedance).